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ABSTRACT

A pilot of the third grade "Math Their Way" program was conducted in eight classrooms in five Portland (OR) elementary schools during the 1983-84 school year. The eight teachers selected by principals expressed interest in participating in the pilot. The pilot teachers were supported by year-long inservice training conducted by the project coordinator (who also developed the curriculum). Fall to spring math achievement gains for the total 150 students were greater than average gains for the third grade district-wide. When achievement gains were considered by each of the eight participating classrooms, results were diverse; gains ranged from significant positive gains to gains which were equal to the District average. Some error is associated with statistical interpretations due to the small size of the eight pilot classes; all but one contained fewer than 25 students. Student attitudes toward math were surveyed before and after the pilot implementation. Both before and after, students reported positive feelings about math, and their math ability. Principals considered the teacher inservice program outstanding. The project coordinator provided year-long support through group instruction, weekly classroom planning, in-class instructional modeling and team-teaching, with on-going opportunities for supplementary planning assistance. (Author)

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IN
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ADMINISTRATIVE SUMMARY

Third Grade Math Their Way Pilot Project

1983 - 1984

A pilot of the third grade Math Their Way program was conducted in eight classrooms (Total N = 150) in five elementary schools during the 1983-84 school year. The eight teachers selected by principals expressed interest in participating in the pilot. The pilot teachers were supported by year-long inservice training conducted by the project coordinator (who also developed the third grade Math Their Way curriculum).

Fall to spring math achievement gains for the total 150 students were greater than average gains for the third grade District-wide. When achievement gains were considered by each of the eight participating classrooms, results were diverse; gains ranged from significant positive to gains which were equal to the District average. Some error is associated with statistical interpretations due to the small size of the eight pilot classes; all but one contained fewer than 25 students.

Student attitudes toward math were surveyed before and after the pilot implementation. Both before and after, students reported positive feelings about math, and their math ability.

Principals considered the teacher inservice outstanding. The project coordinator provided year-long support through group instruction, weekly classroom planning, in-class instructional modeling and team-teaching, with on-going opportunities for supplementary planning assistance.

INTRODUCTION

In order to improve elementary mathematics learning and achievement of Portland Public School students, the Curriculum Department has sought to identify instructional programs and methodologies which appropriately match the learning needs of primary school students. K-2 Math Their Way is perceived as a program which provides a firm conceptual foundation for mathematics learning. The program emphasizes manipulative learning experiences suitable for the early primary years, and closely matches the District mathematics scope and sequence. A description of the relationship of Math Their Way, with the District mathematics curriculum, and an overview of the District's interest in, and support for the K-2 program can be found in the Appendix.

With the development of a Math Their Way curriculum for third grade (at which level the Portland Achievement Levels Tests are administered to measure mathematics achievement) and a prototype for suitable teacher training, the Curriculum Department initiated a pilot of the third grade Math Their Way program during the 1983-84 school year. At the request of the Curriculum Department, the Department of Research and Evaluation conducted an evaluation in order to compare the mathematics achievement gains of the third grade Math Their Way group with that of other District third grade students.

THIRD GRADE MATH THEIR WAY PROGRAM DESCRIPTION

The K-2 Math Their Way program assumes that better math learning is enhanced by development of basic mathematics concepts through concrete and visual learning experiences. The concrete-to-abstract strategy is central to the program's instructional delivery.

By exploring a series of structured and sequential math activities, young children are encouraged to see relationships and interconnections within mathematics topics. A thorough understanding of concepts introduced in this manner is recommended to precede the learning of abstract math symbols.

The third grade Math Their Way curriculum was developed consonant with the underlying belief that the concrete-to-abstract learning is a long-term strategy, and therefore clearly suitable for extension to grade levels beyond K-2. Figure 1 presents the scope and sequence of the third grade Math Their Way curriculum.

Figure 1
Scope and sequence for third grade Math Their Way

BASIC TOPICS	INTERRELATED TOPICS
Free Exploration	Counting
Number: Addition and Subtraction	Calendar Arithmetic
Place Value and Regrouping	Patterning
Number: Multiplication and Divsion	Sorting and Classifying
Measurement	Verbal Problems
Fractions and Probability	Graphing
Geometry	Problem-Solving
	Geometry Terms and Concepts

While the Basic Topics of the scope and sequence guide the general Math Their Way instruction, the interrelated topical activities are woven into the curriculum presentations during the entire school year, providing students

increasing opportunities to develop skills and make mathematical applications. The curriculum is more varied than that usually found in basic mathematics texts because, in addition to arithmetic, it offers more-equalized attention to all the topics (both Basic and Interrelated) outlined in the scope and sequence. Instead of teaching mathematics according to a traditional linear format, the Math Their Way approach involves students in a continuing process of investigation, experimentation and expansion in all the curricular topics all year long.

A stations-approach is integral to the instructional delivery. It enhances the teacher's opportunities to provide concept level instruction at all levels of student ability by providing learning activities at varying levels of difficulty. A heterogeneous class group can be accommodated in pursuing a topic together and, at the same time, students of different abilities are appropriately challenged.

Coupling the stations-approach with a weave of instruction in both basic and interrelated topics provides students more and variable periods of work time to master and extend concepts, while allowing teachers increasing opportunities to observe and facilitate various stages of individual student and group learning.

Instructional activities within each of the curriculum topics are of two kinds. First, whole group teacher-directed Concept Level experiences are presented. Through observations and guided questioning by the teacher, students are encouraged to verbally articulate mathematical concepts in reference to manipulative materials. The second kind of activity is one in which students take the next step and talk their way through the explanation without relying on the manipulative references. It is at this second stage that the teacher assumes that students are moving from earlier Concept and Connecting Levels to a Symbolic Level of mathematical understanding.

Figure 2 presents the teaching/learning continuum upon which the Math Their Way curriculum is built. All the learning activities within both Basic and Interrelated curricular topics are organized along this continuum.

Figure 2

Math Their Way instructional/learning continuum

	INSTRUCTIONAL/ LEARNING LEVEL	DESCRIPTION OF RELATED ACTIVITIES
TEACHER DIRECTED	CONCEPT	Teacher and students work with real things, talking mathematics, developing understandings, references and language without symbols.
	CONNECTING	Teacher records symbolic notation to go with oral language used to describe a mathematical concept or relationship, e.g., "Four children stand and one sits down:" 4-1=3.
INCREASINGLY STUDENT-DIRECTED	SYMBOLIC	Students record their own symbolic notation to accompany investigations and they read their notations, e.g., Student tosses a die twice and gets "5" and "6"; student records 5+6=11. Students most often still make use of referents while recording.
	ABSTRACT	Students record with symbols alone, and without reference to concrete materials.

Putting Math Their Way instructional theory into practice involves a considerable adaptation in regular classroom management and instructional behavior. Teachers are required to work with far more materials than they may be used to; the math book, pencil and paper give way to extensive collections of manipulative materials and supplies. The stations activities may require a different physical organization in the classroom to accomodate varieties of groups at different stations and work areas.

Because of the cooperative nature of both the instruction and the learning, it is important to note that the recommended management arrangements provide both teachers and students themselves continuing opportunities to discuss and assess student learning.

THIRD GRADE MATH THEIR WAY PILOT PROJECT

During the 1983-84 school year, the third grade Math Their Way curriculum was piloted in eight third grade classrooms in five elementary and Early Childhood Education Centers.[1]

In the pilot classrooms, approximately eighty percent of math instructional time was devoted to Math Their Way while the remaining twenty percent was used with the adopted basal texts (either Macmillan or Scott-Foresman). Direct instruction was provided by Math Their Way; practice, and evaluation of students' ability to transfer at an abstract level was provided by the basal texts.

Table 1 displays schools and numbers of third grade pilot classes and students for whom achievement scores were available both fall and spring of the 1983-84 school year.

Table 1

Third Grade Math Their Way Pilot Project Participants

SCHOOL	THIRD GRADE	
	CLASSES	STUDENTS
Alameda	1*	14
Chief Joseph	1	16
Irvington ECEC	1	19
Harvey Scott	2	20/24
Vernon ECEC	3*	14/18/25

*At Alameda, the pilot class was ability-grouped for mathematics instruction and had a somewhat shortened class period. At Vernon ECEC, a form of "modified" ability grouping was employed; one class consisted of the highest-achieving third graders in the school, and the other two classes were more heterogeneously grouped.

1 One third grade teacher at Ball School began the pilot, but was re-assigned to another grade level due to building enrollment changes. At that time, an additional third grade teacher from Vernon ECEC joined the project.

Selection of Pilot Schools and Classes

Principal's administrative support was a criterion in selection of pilot schools for the third grade Math Their Way pilot project. Principals had generally supported Math Their Way either through earlier K-2 program implementation or for teacher in-service training in the methodology.

Teachers were selected according to their open-mindedness to the philosophy, their professional orientation, and acceptance of the Math Their Way methodology.

Figure 3 describes the pilot teachers in terms of their training and experience with the program.

Figure 3

Training/Experienced Pilot Teachers for Math Their Way

SCHOOL/TEACHER	TRAINING/EXPERIENCE MATH THEIR WAY
Alameda Teacher, 1	Had brief previous training in first grade program
Chief Joseph Teacher, 1	Had no training; had previous experience teaching K-2 program
Harvey Scott Teachers, 2*	Had previous training and experience by participating in development of third grade curriculum
Irvington ECEC, Teacher, 1	Had no training; no previous Math Their Way experience
Vernon ECEC, Teachers, 3*	Had no training; no previous Math Their Way experience

*Both teachers at Harvey Scott and one teacher at Vernon had worked with a Math Their Way specialist in previous years on related math projects.

After being contacted by the principal and/or the project coordinator, the eight teachers expressed interest in participating in the pilot project. The pilot group varied in terms of actual experience with the methodology; half the teachers had worked with Math Their Way in either the primary program or during the development of the pilot curriculum, and half had no direct experience with either the program or the methodology. All of the pilot teachers needed inservice; even those who had participated in earlier training were given additional supportive training in order to implement the third grade curriculum so that the trainability of the method was a secondary emphasis of the third grade pilot project.

Teacher Inservice Training

The eight teachers participating in the 1983-84 pilot project worked through a year-long inservice program from August, 1983, through March, 1984, with the project coordinator. The inservice training provided both group and individual instructional support, and was conducted entirely by the project coordinator.

The four parts of the inservice training component included:

1. 36 hours of group instruction in the third grade curriculum of Math Their Way with emphasis on instructional delivery. Twenty-two hours were provided from August to December, 1983, and an additional 14 hours were provided during the last half of the school year.[2]

2. One-to-one (or sometimes small group) planning support was provided teachers in their own schools. This planning usually occurred on a weekly basis (September-November, February and March) for approximately 30 minutes per session.

3. Each week (September-November, February and March) one class period of modeled instructional strategies was provided by the project coordinator for each pilot teacher. Pilot teachers remained in the classroom to observe.

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2 Participating teachers received university credit for participation in the pilot inservice training program.

4. Additional planning support was provided either at teacher request, or at the initiation of the project coordinator.

Figure 4

Math Their Way Outline of inservice for
1983-84 third grade pilot project

Kind of Inservice Training Provided	Approximate Number of Hours of Training Received by each Teacher	Total Number of Training Hours Provided by Project Coordinator
Group Instruction	36 group hours	36 hours (group)
Individual Weekly Planning Support*	1/2 hour per week for 18 weeks, or 9 hours for each teacher	9 hours x 8 individual teachers = 72 hours
Individual In-Class Modeling, Demonstration, Teaming	1 hour per week for 18 weeks, or 18 hours for each teacher	18 hours x 8 individual teachers = 144 hours
Totals	36 hours group instuction and 27 hours individual planning/training support received by each teacher	252 hours training provided by project coordinator

Thirty-six of the training hours were provided in group instruction, and an additional 27 hours per teacher were provided in individual or small group sessions. Slightly more than six 40-hour weeks were expended in training all eight teachers in the pilot project. The individual in-class modeling (18 hours per teacher) occurred during the regular instructional day; the remaining planning hours (approximately 9 hours per teacher) were provided both during and outside the regular instructional day; principals reported they did make an effort through scheduling to provide time during the school day or during after-school meetings for the individual weekly planning support meetings.

*Supplementary support was provided by the coordinator at teacher request.

Math Their Way Pilot Project Coordinator

The project coordinator developed the third grade Math Their Way curriculum in 1981-82, and planned and implemented a related teacher-in-service program during 1982-83. The coordinator provided full support for the 1983-84 pilot project both in terms of organizing and maintaining material curriculum resources, and providing the continuous teacher inservice.

In addition, the coordinator conducted two parent-community informational sessions at the pilot schools. A fall parent orientation session was held at each pilot school for the purpose of introducing parents to the program and its instructional methodology. In the spring, parent evenings were conducted at two of the pilot schools to engage parents and students as partners in the instructional approach. The project coordinator provided an evaluation form to the 32 parents who attended. A summary of parental responses to the orientation is in the Appendix.

Finally, the project coordinator worked closely with the Research and Evaluation Department throughout the 1983-84 pilot year, providing information about the pilot in progress, and designing a student survey intended to measure participating third graders' attitudes about the Math Their Way experience.

EVALUATION

Evaluation of the third grade Math Their Way pilot project was conducted by the Department of Research and Evaluation in cooperation with the Curriculum Department of the Portland Public Schools.

The primary focus of the evaluation considered this question: Do students who participate in Math Their Way make the same achievement gains as students who do not participate in Math Their Way? A secondary emphasis of the evaluation considered student attitude regarding the Math Their Way learning experience.

Because the pilot schools were selected according to the principal's support for the program, the five principals were interviewed to ascertain the nature of their administrative support for Math Their Way.

Student Achievement

Achievement growth was measured by the Portland Achievement Levels Test in mathematics, administered both fall and spring to all District third grade students, including those participating in the pilot project. Mean achievement gains of the pilot group were compared with mean achievement gains of third graders District-wide. For both groups (pilot as well as District-wide third grade) only clear and intact group scores were used; that is, only if a third grade student had both a fall and spring mathematics score in the same school, would the score be included for comparative data analysis.

The results are reported in tables using Deviation scores and GROW indices for clear and intact groups. These are defined as follows:

1. Clear and intact groups include students who had fall and spring test scores for a given year (clear) and were enrolled at the same school in the fall and spring (intact). The Deviation and GROW scores are based on one year clear and intact groups.

2. Deviations are group statistics showing the deviation of a group mean from a mean of all group RIT means in the District. RIT scores are equal interval curriculum-based scores that are obtained from Portland Achievement Levels Tests.

3. GROW is an index that represents the amount of achievement growth in clear and intact groups in a given year. It shows the deviation of groups' fall to spring gain from the mean gains of all grade level groups in the District.

The criteria for interpreting GROW is presented in Figure 5.

Figure 5
Criteria for interpretation of GROW values

GROW Value	Interpretation
-2.0 and below	Negative significant gain
-2.0 to -1.7	Negative gain approaching significance
-1.6 to -.7	Non-significant negative gain
-.7 to .7	No gain or loss
.7 to 1.6	Non-significant positive gain
1.7 to 2.0	Positive gain approaching significance
2.0 and above	Positive significant gain

Table 2 presents the fall and spring mathematics deviation means, and the fall to spring growth for the entire third grade pilot group. According to the interpretation guide presented in Figure 5, the total pilot group GROW was a nonsignificant positive gain interpreted as being greater than that of the fall to spring growth of District third graders not in the Math Their Way program.

Table 2
Mathematics Standard Deviation Means showing Growth for the Math Their Way Third Grade Pilot Group

Deviations of Group Means		Growth F to SP
Fall, 1983	Spring, 1984	GROW
-.11	.72	1.58
N (148)	(148)	(148)

In order to determine whether this positive gain was more or less evenly distributed among the individual pilot classes, the deviations and GROW scores for all eight Math Their Way groups were examined. Table 3 presents these data in descending order from the class with the greatest gain to the class with the least gain. The final column of Table 3 includes an interpretation of the statistical significance of class gains at the .05 level according to the guidelines presented in Figure 5.

Table 3

Mathematics Standard Deviation Means Showing Growth for Math Their Way Pilot Classes

CLASS	Deviations of Group Means Fall, 1983	Spring, 1984	Growth F to SP GROW	Interpretation of GROW Value
1	-.60	2.20	5.24	
2	-.17	1.48	3.11	Positive Significant Gain (2.0 and above).
3	-1.7	-.57	2.12	
4	1.07	1.65	1.10	Non-significant Positive Gain (.7 to 1.6).
5	.58	.89	.60	
6	-1.62	-1.64	-.02	
7	-1.40	-1.73	-.61	No Gain/No Loss -.7 to .7).
8	1.94	1.58	-.66	

Table 3 displays a wide range of GROW values, even within the four classes with positive gain and the four which neither gained nor lost. It is important to recognize that some error is associated with these interpretations due to the small sizes of the participating classes; all but one of the pilot classes consisted of fewer than 25 students.

Student Attitude Survey

An attitude survey was developed by the project coordinator and the Department of Research and Evaluation. In the fall and spring, a representative of the Department of Research and Evaluation administered the three-question survey of the eight Math Their way pilot classes.

Questions were presented orally, and students responded by marking "Yes" or "No" in response to each question. The three questions were: a) Did you like math last (this) year?, b) Is math fun?, and c) Are you good at math?

Table 4 presents the survey questions and student responses before and after participation in the third grade Math Their Way program.

Table 4
Percentage of Student Responses to Attitude Survey
Before and After Math Their Way Program

	SURVEY QUESTIONS		RESPONSES YES %	RESPONSES NO %	TOTAL N
QUESTION 1	BEFORE:	Did you like math last year?	90	10	103
	AFTER:	Did you like math this year?	86	14	133
QUESTION 2	BEFORE:	Is math fun?	86	14	105
	AFTER:	Is math fun?	86	14	132
QUESTION 3	BEFORE:	Are you good at math?	81	19	112
	AFTER:	Are you good at math?	77	23	130

The third graders who answered the three survey questions both fall and spring reported that they liked math, found it fun, and perceived themselves as being good at math--both before and after their participation in the Math Their Way pilot project. The differences between proportionate responses before and after Math Their Way were non-significant. Because positive feelings about math were so extensive among the pilot group before Math Their Way, it would have been difficult to assess an increase in positive perceptions. Nevertheless, it is important to note that the program did not in any way detract from the students' positive feelings about their mathematics learning.

Principal Topic Survey for Math Their Way

A complete list of principals' responses to the Topic List for Math Their Way may be found in the Appendix. Their remarks have been summarized under the following subtopics: 1) instructional program management, 2) District support for the third grade pilot project, 3) student effects, 4) teacher effects, and 5) community/parental perceptions about the Math Their Way program.

1. Instructional Program Management. The principals reported that Math Their Way contributed to improved math achievement at both District and building levels. In three of the five pilot schools, the third grade curriculum naturally extended K-2 Math Their Way programs already in place. Principals reported that they were interested in seeing the concrete-to connecting-to-symbolic-to-abstract learning take place as well as the transition to solving math problems. While the curriculum was described as being directly related to the District mathematics continuum, two principals had questions about the fit of Math Their Way with new District mathematics adoptions.

2. District Support for Pilot. Principals agreed that Math Their Way requires extensive training and continuing teacher support. The project director's supportive leadership was uniformly described as "outstanding" and "of the highest quality."

3. Student Effects. Increased student achievement for all students -- low, middle and high -- was cited as the chief student benefit. Principals reported observing the following behaviors in the pilot classrooms: increased student attention span, increased time on task, interest and involvement with learning activities, improved verbalization about mathematics, skills in problem- solving, and continuing opportunities to participate in group work. The materials which form the basis of the hands-on, concrete learning experiences were regarded as functional, varied, and appropriate.

4. Teacher Effects. While one principal noted some historical "unfriendliness" toward the program from earlier introductions of the program, two principals remarked that the program may be closely related to individual teaching style. The principals perceived their pilot teachers to be positive about the third grade program experience.

5. Parent Perceptions. Principals recommended a parent orientation to the Math Their Way program.

Findings

The third grade Math Their Way pilot group made a large positive gain, though it was not enough to meet the requirements of statistical significance. The third grade Math Their Way pilot program produced positive non-significant group achievement gain 1.5 standard deviations greater than the third grade District average.

Though the net result was positive, individual class results were diverse. When achievement gains of each of the eight pilot classes were analyzed, there was a wide range of Growth from fall to spring; three classes made significant positive gains, one class made a non-significant positive gain and four classes neither gained nor lost.

Principals considered the teacher training and inservice outstanding in provision for continuous year-long support for teachers through group instruction, weekly classroom planning, in-class instructional modeling and team-teaching, and opportunities for supplementary planning assistance.

The comprehensive teacher-training effort which supported the pilot implementation in eight classrooms provided approximately 27 hours of one-to-one learning for each teacher, plus an additional 36 hours of instruction for the group as a whole.

The pilot school principals provided administrative and instructional support for the Math Their Way pilot implementation. A measure of achievement gains in another basic skills area, reading, was carried out in order to provide indirect inference of the level of support emphasis for the new Math Their Way program. If Math Their Way were given unusual administrative support, different from that extended to reading, one might expect that math gains would increase and reading gains decline. There did not appear to be undue support for the program as indicated by an analysis of reading gains for the pilot group which showed some variation but regular growth overall.

In the judgment of the evaluator, the third grade pilot was given a reasonable opportunity for success in all five pilot schools.

Conclusions and Recommendations

In terms of student outcomes, achievement gains fall to spring for the third grade pilot group were greater than average gains for the third grade District-wide. When achievement gains were considered by each of the eight participating classrooms, results were diverse; gains ranged from significant positive to gains which were equal to the District average. Student attitudes toward math were surveyed before and after the pilot implementation. Both before and after, students reported positive feelings about math, and their math ability.

In terms of teacher inservice, principals consider the pilot training program outstanding in its provision for year-long support through group instruction, weekly classroom planning, in-class instructional modeling and team-teaching.

It is recommended that future evaluations of the District's Math Their Way implementation address the effectiveness of the various inservice components for support of the program in the primary grades. It is also recommended that criteria for levels of program implementation be established in order to consider whether a range of diverse student outcomes may be related to different instructional emphases.

APPENDIX

RELATIONSHIP OF MATH THEIR WAY WITH DISTRICT MATHEMATICS CURRICULUM

The Curriculum Department of the Portland Public Schools, in preparation for the new mathematics adoption for 1984-85, has addressed the issue of low-performance in elementary mathematics by focusing upon appropriate instructional materials and techniques which match learning needs of elementary students.

To that end, the District has supported a basic K-8 mathematics text which closely matches the Portland Public Schools mathematics scope and sequence and a primary-level companion manipulative program which has shown promise in providing a firm conceptual foundation in mathematics. Math Their Way is considered to be particularly responsive to the District's mathematics curricular goals in that it presents the primary curriculum more intensively and developmentally than does the basal math series.

The goal is that a District-wide introduction of the comprehensive Math Their Way program, accompanied by extensive and adequate staff development, plus the basal adoption, will indeed produce achievement gains for all students, and for low-performing students specifically.

This co-basal approach supports teacher use of two integrated math approaches: a) Math Their Way for development of concepts and connecting skills whereby students are able to talk their way through their math problems, and, b) an adopted basal text to be used for practice and evaluation of operations skills.

MATH THEIR WAY IN THE PORTLAND PUBLIC SCHOOLS

In 1976, the K-2 Math Their Way curriculum was first introduced to the Portland Public Schools as a pilot program in Area II. Ten classroom teachers were provided teacher manuals, instructional materials, and a year-long supportive inservice through participation in twice-monthly study-group sessions. A mathematics specialist from the Area II Curriculum Department coordinated the pilot project and the inservice sessions at which participants generated topical concerns and study questions based on their common instructional experiences.

The original pilot participants (including the coordinator) attended a variety of training sessions with the program developer; a brief orientation session in the fall of 1976, a nine-day inservice session during summer 1977, and a follow-up workshop in 1979. Approximately forty additional Portland teachers attended the 1979 workshop.

In the spring of 1977 Math Their Way was adopted as a co-basal program for K-1 in Area I, and for K-2 in Areas II and III. The Area II Curriculum Department provided a pre-adoption inservice in the spring and a twenty-two hour inservice session during fall, 1977. That fall, all District teachers received teacher manuals and kits of instructional materials. Introductory training classes were held during fall of 1978 and 1979 as well. Since 1979, District support for Math Their Way has continued in the form of occasional Teacher Inservice Credit (TIC) workshops and regular provision of instructional materials.

The Curriculum math specialist who coordinated the 1976 pilot remained instrumental in dissemination of the Math Their Way approach for interested teachers in the District. Similar kinds of instructional sequences were designed for use with low-performing Chapter I students in grades three through five. During the 1981-82 school year, the math specialist worked with two third grade teachers and developed a third grade Math Their Way core curriculum, which those teachers continued to use during the 1982-83 school year. During 1982-83 the math specialist, while on assignment as a Chapter I teacher in a District Early Childhood Education Center, devised and

implemented a teacher-training model as part of her building assignment. The model was implemented to provide support for an introduction of Math Their Way in grade two in the building.

Both the third grade Math Their Way curriculum, and the teacher-training model were used in the 1983-84 pilot project.

EVALUATION

Of the June Parent-Child Math Night

1. Was the evening's program of _____ interest to you?
very much some very little

2. Did you get any new insights or did any of your attitudes change?
_____
new insights some no change

3. Was there enough time for discussion?
_____
too much just right too little

4. Did you learn about the goals of your child's math program?
_____
yes somewhat no

5. What were the strong points of the meeting?

6. Do you have any suggestions for improving such a meeting?

Of the September to June Math Instruction which my child received this year

1. How do you feel about the progress your child has made in math this year?

2. What do you like about the math program this year?

3. What do you dislike or have concerns about with regard to this year's math program?

4. Any other comments:

SUMMARY OF PARENT RESPONSES TO EVALUATION OF JUNE PARENT-CHILD MATH NIGHT

		Very Much	Some	Very Little
1. Was the evening's program of interest to you?	School 1:	17		
	School 2:	15		

		New Insights	Some	No Change
2. Did you get any new insights or did any of your attitudes change?	School 1:	9	7	
	School 2:	10	5	

		Too Much	Just Right	Too Little
3. Was there enough time for discussion?	School 1:		14	3
	School 2:	2	13	

		Yes	Somewhat	No
4. Did you learn about the goals of your child's math program?	School 1:	12	4	1
	School 2:	12	3	

PARENT COMMENTS

School #1: 4 Parents Responded

	POSITIVE	NEGATIVE
1.	Enhanced problem solving Heightened child's interest in math Makes math fun The teacher; closer to real-life analytical skills	Fear of fourth grade being a let-down Long-term follow up Are "standard tests" a reasonable measure of progress?
2.	Much more confidence Now likes math; before didn't Math becomes a relatively easy subject Math is a topic of conversation; she shares what she has learned; finds it interesting	Concern about continutation of similar program Concern about if the child moves out of the school using this or similar program
3.	Good grasp of math; makes them curious; enthusiasm of students	Continuity of effort Need to strengthen basics Teacher-dependent?
4.	Confidence Thinking skills Enjoyment Satisfaction with results Recognizing keys to solving problems Hands-on experiences	Follow through?

PARENT COMMENTS
School #2: 6 Parents Responded

	POSITIVE	NEGATIVE
1.	Excitement to learn math; Understanding of objects to numbers Easy transference to real life More challenging--greater understanding of things to come Visual understanding of graphs More than one way to get an answer	Teacher preparation time
2.	No fear of learning "times," and in general Presence of confidence, aggressiveness in problem-solving Peer teaching Good foundation; real understanding of the concepts	Parent education; but will be easy with good parent support
3.	Enjoyment Visual realities of math No fear Less pressure to perform alone; more group discussion	Homework Daily or weekly involvement by parents in the program Evaluation sheet at the end of the week so we know what to help child in his or her weaknesses
4.	Enjoy math Made interesting Kids learned more	Parents were not informed of the program Not informed of child's progress More homework needed
5.	Enjoy more Teachers others Progressing more	
6.	Visual transfer to paper Teacher caring Fun learning	Why stop at grade three?

PRINCIPALS TOPIC LIST
MATH THEIR WAY

Principals of schools having the third grade Math Their Way program are being interviewed to help with an initial, first-year pilot evaluation by giving information based on their observations and opinions. Your remarks concerning the Math Their Way program under the following topics will be typed and returned to you for verification before being included with the other principals' remarks for inclusion in the report.

1. How Math Their Way fits in with the other instructional programs.
2. Program in-service requirements.
3. Observable benefits to students.
4. Usefulness of materials and equipment in reaching educational goals.
5. Program support for your 1983-84 instructional goals.
6. Influence on school management priorities.
7. Impact on school budget and other resources.
8. Quality of support services from the central office.
9. Contribution of aides to the program.
10. Impact on teacher morale.
11. Pupils' manipulation of equipment.
12. Reinforcements of student learning.
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14. Learning theory underlying the Math Their Way program.

PRINCIPALS' RESPONSES TO TOPIC LIST
MATH THEIR WAY

Principals of schools having the third grade Math Their Way program are being interviewed to help with an initial, first-year pilot evaluation by giving information based on their observations and opinions. Your remarks concerning the Math Their Way program under the following topics will be typed and returned to you for verification before being included with the other principals' remarks for inclusion in the report.

1. How Math Their Way fits in with the other instructional programs.

   Responses:

   - Mathematics has been a priority at our school. When I came to this school reading achievement was high, but mathematics achievement was lagging. Therefore, I started a campaign to improve the mathematics program and achievement scores.

   - The staff and I need to show how Math Their Way fits into the mathematics program. We need to illustrate how Math Their Way affects achievement scores.

   - Math Their Way is in here in K-5. The program was adopted based on the student need for this kind of learning, and the staff has participated in training for appropriate use of the program.

   - Math Their Way can be infused any time of the day. If the teacher has an attitude that is supportive, she will set aside 45 minutes to an hour each day for it. If building facilities can be utilized, it is easier to fit the program in without a lot of materials shifting.

   - (Re fit with other instructional programs) I don't know if we know that, I have some questions about that.

   - Math Their Way fits because it adds to the basic skills we are trying to accomplish. It's still a tough question to see how it will fit the first year implementation with Heath, but the first year has kids working a lot on patterning.

   - Other programs fit into Math Their Way. Low achieving students especially can develop with this program. The basal provides stuff to use and keeps parents knowing that kids can do the program. Math Their Way provides the concrete experiences.

2. Program in-service requirements.

Responses:

- We implemented Math Their Way during the 1982-83 school year. It was implemented the way the District is recommending for the 1984-85 school year. One of the best qualified Math Their Way teachers in the District and I planned the launching of the program here. During the first half of the year, she met with the first grade teachers to plan, implement, and evaluate the Math Their Way program. She met with every first grade classroom on each Friday for one hour to model, with the homeroom teachers observing or teaming with her. She stayed in close communication with me during the program. On each Friday, at 2:30 p.m., she held a meeting with the teachers to evaluate what had transpired during the week, and planned for future events. For the second half of the year, she worked with the second grade teachers and the first grade teachers continued to attend the Friday meetings.

- In order to implement the program, it is necessary to have a teacher orientation, and regular meetings. Jan spending half a day in each building was good to demonstrate, implement new learning, critique, and reinforce. The weekly cycle helps teachers not to forget their place in curricular development and gives the supervisor, such as Jan, something to look at when she comes in to work with the teacher. At least monthly meetings are required for a pilot to allow for sharing. There are some teacher attitudes that are important or key in selection for participation in a pilot; our pilot teacher doesn't mind learning something new. The mark of the true teacher is that she never quits learning--Jan says she learns things from teachers.

- Program inservice requirements are extensive, or we wouldn't have 11 people out teaching teachers to use it. It takes more training than other programs because of the emphasis on direct instruction. Teachers are not all that comfortable with direct instruction in that amount.

- About the inservice--if you're going to get to where we are in third grade, you are talking a big inservice, lots of time and large expense. Those teachers work summers, Saturdays, evenings.

- We will never keep this program going unless they have a person whose sole job is to run around, support and keep teachers on task with the program. You have to constantly check and support teacher progress with the program.

3. Observable benefits to students.

Responses:

- o In my observations, the program helps the achievement of both slow and bright students. Achievement growth at third grade was very significant. Children got a chance to understand and to internalize mathematics; I have observed that happening. Math Their Way is equally demanding for children and for teachers. It takes additional teacher planning time.

- o Observable benefits to students: I saw youngsters having a longer attention span; saw high interest in what was being presented; greater involvement; youngsters contributing who often just sit and wait for others. And there was higher achievement (gains). We recognized that the youngsters had a need and that conceptual learning was the area of their need and this program meets that need.

- o Our test results look good. It looks to me like the program and teacher effects are hard to separate especially for those in the field test. I do believe that programs do have an independent effect on their own. Kids enjoy math in the program and their enthusiasm and work in problem-solving is observable.

- o Kids seem to like math; they scored higher on achievement tests. They seemed to develop math concepts a little better.

- o Benefits to children are endless; they work in groups; they are on task a higher percentage of time; they can verbalize what they are doing; they are happier with their worksheets and use them as a treat instead of viewing them as a requirement; so far the scores seem to be up.

4. Usefulness of materials and equipment in reaching educational goals.

Responses:

- o The materials are useful because of their variety; they are functional in reaching the educational goals of mathematics concepts learning. The materials are appropriate.

- o The materials seem useful; they give the kids some hands-on experiences with number concepts, demonstrations of place and value is not strictly moving numbers from one column to another.

- o When you teach Math Their Way, you have to have materials and the equipment; they are manditory. From a principal's point of view I wonder if the District will provide the continuing supply for the program.

- o You can't do without the basis of the program, which involves a concrete hands-on learning experience.

5. Program support for your 1983-84 instructional goals.

Responses:

- We developed a syllabus for Math Their Way. As this was being used, the teachers were able to see their students learning and the teachers were also learning. The kindergarten teachers had much experiences with Math Their Way and they did not need to work as extensively with the consulting teacher who was here last year. After having these kinds of experiences in kindergarten through second grade, it seemed appropriate to continue with the third grade. I reviewed Jan Gillespie's third grade Math Their Way curriculum, attended the first inservice session in late spring of 1983 and supported its use. I selected a third grade teacher to pilot the third grade Math Their Way program.

- I have observed a lot of lessions and kept close tabs on the pilot project. Jan and I have a working relationship: whatever Jan needed she got. My way is to support programs and find needed resources. At the same time, this pilot supported my building goals for improved teacher instructional programs.

- We have math specialists here in our building that can teach our other teachers. A curriculum specialist was also available from the area office for our use, and it looks like the district will supply the initial materials kits.

- The major goal is to raise achievement scores, so Math Their Way fits right in. The other goals are to teach to ability and style of students we have in this school and this program is right on. It is going really well but it is hard to keep it going well.

6. Influence on school management priorities.

Responses:

- With regard to school management priorities, everything that has to be managed receives equal priority. Scheduling is required to keep teacher's morning free one day a week; that is easy to implement if the principals attitude supports the program.

- The program has an influence all right. It appears that teachers become total disciples or they remain lukewarm; gung ho or "I can get along without it." Problems occur with that and some concerns, such as the storage of materials, amount of time to organize and set them up.

- I have spent a half FTE for two years to keep it going. The program is used in our K-2 program. I have given up principal meeting time to allow teachers to meet for the program, used building supply funds considerably; whatever teachers need, we buy; buildings have to pick up the slack needed to keep programs like this going or teachers will say it isn't any good and it will be gone so fast as to make your head spin.

7. Impact on school budget and other resources.

Responses:

- The physical needs for the Math Their Way program can be obtained from the Basic Skills proposal, the Curriculum Department, or from the consolidated school budget.

- There has been no impact on school budgets; we had the resources, used supply budget for other things needed.

- The District provided Jan to work with our pilot teacher. We support the program with extra curricular materials, and they will be budgeted for next year as well. The Math Their Way kits are complete but we want some supplementary materials and have budgeted for that. Some of the concepts overlap those in science and we will create grade-level kits which will be useful to teach both math and science, e.g., in the area of measurement.

- The inservice will cause a big impact but I guess we will eventually have to start paying teachers to take as much as is required.

- I have spent a half FTE for two years to keep it going. The program is used in our K-2 program.

8. Quality of support services from the central office.

Responses:

- o Jan Gillespie has provided oustanding leadership and modeling.

- o Jan has been outstanding. Her attitude toward math is at the highest level. She treats people with the greatest respect and gets along with everyone. She is serious but has a "don't let this thing kill you" attitude. The hands-on experience Math Their Way brings to both students and teachers helps them keep their learning longer; the initial experience is worthwhile.

- o Jan G. is outstanding. It's a model I discussed with the assistant superintendent for curriculum--why not convince him the way to get proper support for teachers is not to keep a cadre of teachers in the administration building, but pull teachers out to work in other classes for a year, modeling good teaching. It would be an incentive for teachers, a nice break for them. This contrasts with the current staff development model which has been there a long time--better to use practicing teachers who are using skills tailored to needs, instead of providing workshops according to skills of staff development group there.

- o With our pilot there has been good support by Jan G. Jan G. spent all her time with our people in this building.

- o She worked out her pilot development system of working in the classrooms with the teachers, going in and modeling.

9. Contribution of aides to the program.

Responses:

- We have used no teacher aides in the program, but some parent aides provided assistance. The parents really got into the program at the Night activity for Math Their Way.

- Two classroom aides in the third grade contribute to Math Their Way by setting up, preparing and instructing in the program and acting as an adjunct to the teacher. Our teacher is quite pleased with achievement results. Could impact staff morale if spring 1985 scores are high and I think they will see some differences.

- We don't have any aides in the program at present.

10. Impact on teacher morale.

Responses:

- o During the 1983-84 year, we used Math Their Way along with Scott Foresman. I was not always aware of the time allocated to each of the programs. Our style of implementing Math Their Way in 1982-83 did not pressure teachers into using it. We also used Math Their Way with our Disadvantaged students.

- o The teachers are pleased with the program. I'm enthusiastic, but take a low-key approach to implementing programs of this magnitude. The third grade teacher's morale this year was good; receptive to the program.

- o Historically, there are some elements of "unfriendliness" about the Math Their Way program. I think this is the third time around for Math Their Way. First it was used in the sixties, then in the mid-seventies and now. When I was at another school, I participated in a hit-and-miss inservice.

- o There as been no hostility to the program. Morale of "Math Their Way" is up! The program has been here, and the teachers all have a "I know it's a good program" attitude, acceptance level above average.

- o We have a smattering of other Math Their Way instruction in the building. One second grade, one first and the pilot teacher. When adopted it was popular. We used Real Math by Open Court which is philosophically different but was recommended for District adoption for problem solving K-3, so a couple of teachers use and really like that too.

- o The program has had a big impact and has created some hard feelings--while other teachers are tickled to death and think it is the center of the universe others say we've been doing a lot of manipulative stuff anyway. Some teachers are looking more at Heath, much more accepting for Heath generally in this building. We do Math Their Way somewhat in first, second and third grades. Some teachers feel the budgetary requirement of the program is a little greater than the district should undertake.

- o Pleased with the work, admitting that it is hard work but the fruits of the labor are there because their scores are up. The program goes well with a looser teacher; Math Their Way is handled well.

11. Pupils' manipulation of equipment.

Responses:

- o You can visit classrooms and see children working equations and understanding what they are doing. It is disappointing that older children did not have the same kind of experiences.

- o The materials are useful because of their variety; they are functional in meeting the educational goals of mathematics concepts learning. The materials are appropriate.

- o The materials seem useful; they give the kids some hands-on experiences with number concepts, demonstrations of place value that is not strictly moving numbers from one column to another.

- o Based on what I have seen, and during observations I have made in the classroom, the kids handle the materials pretty well. Now and then one kid drops something and crawls under a table to get it, but all in all it's pretty good.

- o Students learn by experiencing the concrete to the conceptual; students need to manipulate and conceptualize.

12. Reinforcements of student learning.

Responses:

- o Reinforcement of learning naturally happens with this program. This is a program that builds and at the same time provides strong reinforcement to previously-taught concepts.

- o The pilot teacher presents the concepts on the playground, in the cafeteria; helps children apply concepts they have learned to many other settings.

- o Math Their Way touches another learning style, another way to present math concepts as computation. Some students aren't able to reach the goals using just abstract techniques.

- o Of course it reinforces mathematics learning. It is designed to allow teachers to demonstrate, have students work hand-on, have guided practice and then constant spiraling of all concepts so that kids won't forget what they have learned; the curriculum spirals around very nicely.

13. Perceptions of parents and staff.

Responses:

- Teacher and parental perceptions on the whole are good. During the 1984-85 school year, we need to do a better job with parent orientation. We need to have dynamic grade-level presentations for parents, as some think that children are just "playing around."

- Parents' Night was outstanding.

- I don't know the parental perceptions; I will do some educating next year. The presentations for math adoptions that our teachers attended were excellent, so teachers are positive; I attended and the sessions were very well done.

- Parents are concerned that no math papers come home until after the first of the year. No work goes home; I get calls from parents on "Aren't you teaching math this year?" But after a while, when they begin to see the results, the parents change their ideas a little bit.

- Parents are not aware of that their third graders are getting something different and the rest of the staff is "blah" on it. What I have done as a result of our participation (third grade pilot students) has impacted on where we are placing kids next year.

PRINCIPALS TOPIC LIST
MATH THEIR WAY

14. Learning theory underlying the Math Their Way program.

Responses:

- o Math Their Way is going to be a 1984-85 priority. This program allows children to move from the concrete to the connecting, to the symbolic, and to the abstract. I want to observe that progression, but I also want to see that children can put a problem on paper and solve it successfully. I think the Heath program lends itself better to the total mathematics program that Scott Foresman.

- o Some educators say bright children will learn no matter how you teach them, but some students have a greater need for manipulatives. Bright children through their involvement with Math Their Way will perform better with advanced mathematics later in their education.

- o The program is soundly-based and related directly with our mathematics continuum. We will basically be evaluating students on the kind of learning they are getting through the program.

- o It's a question mark how one gets from the initial demonstration of concepts to computational proficiency. It's not the focus of Math Their Way to do that, but since we test that I worry about it some. I assume that the curriculum people have studied its fit with Heath adoptions.

- o The learning theory taps into other learning styles.

- o Brighter kids get brighter, e.g., in grade one when I go into the rooms, the brighter kids are picking up patterns, have a joy in extending them. The program is not limiting; can take any concept and carry it as far as they can if the teacher will allow it. Math Their Way lets a child's imagination be its own limit. Brighter kids need more freedom to cut loose and discover.

PRINCIPALS TOPIC LIST
MATH THEIR WAY

MISCELLANEOUS

Responses:

- Last year Math Their Way activities were presented to the School Board as part of the way mathematics achievement was increased. The Board members then practiced with Math Their Way activities.

- There is a commitment to the program here; and a commitment is needed all the way from the superintendent to the teacher. Math Their Way needs to be well organized. I understand and believe in the Math Their Way program. I see it working here. The only negative feature might be the need for preparing materials for the classes. I'm interested in looking at the ratio of time for the Math Their Way program and the Heath adoption. Next year I want primary teacher level-performance goals written for Math Their Way and I will then observe to see if these goals are being met.

- The MAPS is not based on the rule that you teach a rule and then students predict on the basis of the rule. Another way is to show examples and let students infer relationships--this may not be the most efficient way of learning because the student has first to say, and then show he knows by playing around with examples to get the concepts.

- I got started in this when Math Their Way teachers came here. About the different opinions of teachers toward the program: What the District doesn't understand is--here there are teachers who know the program, people who are here at 7:30 in the morning until 6:30 at night. It takes a lot of time and you aren't going to find teachers to get that kind of extra time for just a math program; I don't think teachers can keep up with that kind of level.

- Next year we'll do some cross-grouping and I don't know how Math Their Way will work with that. Our teachers think the program is great for low kids, but that it retards or holds back the faster kids. Heath is a high-level abstract problem-solving approach that they think will work better for those kids.

- Each year we invite parents in K-3 to see the math program; last year 27 people came and now it is pretty much accepted. Three came this year. We feed home the worksheets and than come out of the program. Some teachers try to use parents as an excuse to stop doing the program. We received 350 responses to a parental survey which about all our program offerings and under the item "Our school is doing a satisfactory job of teaching math" all the comments were positive when directed at our math program, which includes Math Their Way.